

MATH 1103 COMMON FINAL EXAM  
MULTIPLE CHOICE SECTION  
FALL 2001

Please print the following information:

Name: _____	Instructor: _____
Student ID: _____	Section/Time: _____

The MATH 1103 Final Exam consists of two parts. These pages contain Part I which consists of 25 multiple choice questions. Part II consists of free response questions prepared by your instructor. You have three hours for the entire test.

This part of the exam consists of 25 multiple choice questions. They are printed on the front and the back of each page. Be sure that you answer 25 different questions. A special answer sheet is provided so that your answers can be machine graded.

- You must use a pencil with a soft black lead (# 2 or HB) to enter your answers on the answer sheet.
- For each question choose the response which *best* fits the question.
- If you wish to change an answer, make sure that you completely erase your old answer and any other extraneous marks.
- There is no penalty for guessing. However if you mark more than one answer to a question, that question will be scored as incorrect.
- You may perform your calculations on the test itself or on scratch paper, but do not make any stray marks on the answer sheet.
- *Make sure that your name appears on the answer sheet and that you fill in the circles corresponding to your name.*
- *The use of a TI-89 or a TI-92 calculator on this test is a violation of the Code of Student Conduct.*

**At the end of the examination you MUST hand in this booklet, your answer sheet and all scratch paper.**



1. The domain of the function  $g(x) = \sqrt{2-x}$  is  
(a)  $(-\infty, 2]$  (b)  $[2, \infty)$  (c)  $[-2, \infty)$  (d)  $(-2, \infty)$  (e) none of these
2. Find the roots of  $x^2 - 2x + 2 = 0$ .  
(a)  $1 \pm i$  (b)  $-1 \pm i$  (c)  $1 \pm \sqrt{3}$  (d)  $-1 \pm \sqrt{3}$  (e) none of these
3. Find the intercepts of  $y = (2-x)(x^2+1)$ .  
(a)  $x$ -intercepts:  $\pm 2$ ,  $y$ -intercept: 2 (b)  $x$ -intercept:  $-2$ ,  $y$ -intercept: 2  
(c)  $x$ -intercepts: 2,  $\pm 1$ ,  $y$ -intercept: 2 (d)  $x$ -intercept: 2,  $y$ -intercept: 2 (e) none of these
4. The rational function  $R(x) = \frac{x^2-1}{x^2+1}$   
(a) is improper (b) has the horizontal asymptote  $y = 0$  (c) has the horizontal asymptote  $y = -1$   
(d) has an oblique asymptote (e) has the horizontal asymptote  $y = 1$
5. If  $f(x) = \frac{x^2+x+1}{x^2-x-1}$  and  $f(c) = 1$  then  $c$  equals  
(a) 0 (b) 1 (c)  $-1$  (d) 2 (e) none of these
6. Which of the following operations yields the graph of  $y = 2 + 2|x|$  if applied to the graph of  $y = |x|$ ?  
(A) Vertical stretch by a factor of 2, followed by a vertical shift up by 2 units.  
(B) Vertical shift up by 2 units, followed by a vertical stretch by a factor of 2.  
(C) Vertical shift up by  $\frac{1}{2}$ , followed by a vertical stretch by a factor of 2.  
(a) A and B only (b) A only (c) B only (d) A and C only (e) C only
7. If function  $f$  is given by
$$f(x) = \begin{cases} \frac{2-x}{1+x} & \text{if } x \leq 1 \\ \sqrt{4 + \sqrt{x-1}} & \text{if } x > 1 \end{cases}$$
then  $f(1)$  is  
(a) is 0.5 (b) is 2 (c) is 1 (d) is undefined (e) is none of the previous
8. If  $f(x) = x^2$  and  $g(x) = x + 1$ , then  $f \circ g(x)$  is equal to  
(a)  $x^2 + 1$  (b)  $x^2 + 2x + 1$  (c)  $(x+1)^2 + 1$  (d)  $x^2 - 2x + 1$  (e) none of these
9. Let  $f(x)$  be a polynomial whose coefficients are real numbers. If  $2 + 3i$  is a zero of  $f$ , which other complex number is *guaranteed* to be a zero of  $f$  (by the conjugate pairs theorem)?  
(a)  $-2 + 3i$  (b)  $2 - 3i$  (c)  $3 + 2i$  (d)  $-3 - 2i$  (e) none of these

10. The graph of a function  $f$  and its inverse  $f^{-1}$  are symmetric with respect to  
(a) the  $x$  axis (b) the  $y$  axis (c) the line  $y = x$  (d) the line  $y = -x$  (e) the origin
11. Find the inverse of the function of  $f(x) = 2x - 3$   
(a)  $f^{-1}(x) = 2x + 3$  (b)  $f^{-1}(x) = \frac{x+3}{2}$  (c)  $f^{-1}(x) = \frac{x-3}{2}$  (d)  $f^{-1}(x) = \frac{x+2}{3}$   
(e) none of these
12. If  $2^{-x} = 3$  then  $2^{3x}$  equals  
(a) 9 (b)  $\frac{1}{3}$  (c)  $\frac{1}{9}$  (d)  $\frac{1}{27}$  (e) 27
13. Solve  $\frac{\ln(x)}{\ln(2)} = 3$  for  $x$ .  
(a)  $x = \frac{e^3}{2}$  (b)  $x = e^6$  (c)  $x = 7$  (d)  $x = 9$  (e) none of these
14. Solve  $\log_4(x+10) - \log_4(7-2x) = 1$ .  
(a)  $x = 1$  (b)  $x = 2$  (c)  $x = 3$  (d)  $x = 4$  (e)  $x = 0$
15. A certificate of deposit (CD) pays 4% interest, compounded continuously. Find the principal amount needed to invest in this CD in order to get \$10,000 in 20 years. Round your answer to the nearest dollar.  
(a) \$4,493 (b) \$4,021 (c) \$108,328 (d) \$3 (e) \$9,231
16. A pendulum swings through an angle of  $30^\circ$  each second. If the pendulum is 30 inches long, how far does its tip travel each second? Round your answer to the nearest inch.  
(a) 12 (b) 13 (c) 14 (d) 15 (e) 16
17. Find the exact value of  $\cos^2(30^\circ) - \sin^2(30^\circ)$ .  
(a) 0 (b) 1 (c) 0.5 (d) -0.5 (e) none of these
18. Find  $\tan\left(\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$  without using a calculator.  
(a) -1 (b) 1 (c)  $\frac{1}{\sqrt{2}}$  (d)  $-\frac{1}{\sqrt{2}}$  (e) none of these
19.  $(\cos \alpha + \sin \alpha)^2$  equals to which of the following?  
(a)  $1 - \cos(2\alpha)$  (b)  $1 + \cos(2\alpha)$  (c)  $1 - \sin(2\alpha)$  (d)  $1 + \sin(2\alpha)$  (e) none of these

20. The exact value of  $\cos\left(\frac{\pi}{8}\right)$  is

- (a)  $\frac{\sqrt{2+\sqrt{2}}}{\sqrt{2}}$  (b)  $\frac{\sqrt{2-\sqrt{2}}}{\sqrt{2}}$  (c)  $\frac{\sqrt{2+\sqrt{2}}}{2}$  (d)  $\frac{\sqrt{2-\sqrt{2}}}{2}$  (e) none of these

21. The general solution of  $\tan(3\theta) = -1$  is of the form

- (a)  $\frac{\pi}{12} + k \cdot \frac{\pi}{3}$  (b)  $-\frac{\pi}{12} + k \cdot \frac{\pi}{3}$  (c)  $-\frac{\pi}{4} + k \cdot \pi$  (d)  $\frac{\pi}{4} + k \cdot \pi$  (e) none of these

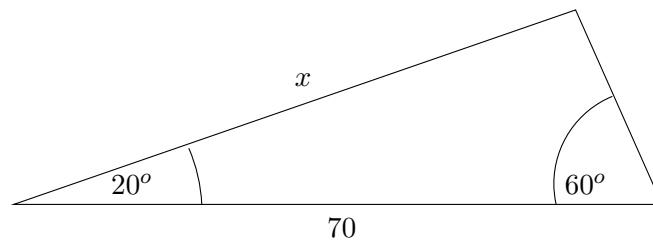
22. The expression  $\sqrt{3}\cos x + \sin x = 1$  is equal to

- (a)  $\cos(x - 60^\circ) = 0.5$  (b)  $\cos(x + 60^\circ) = 0.5$  (c)  $\cos(x - 30^\circ) = 0.25$  (d)  $\cos(x + 30^\circ) = 0.25$   
(e) none of these

23. You are at 10,000 feet from the entrance of a building. The angle of elevation to the top is  $40^\circ$ . How tall is the building? Round your answer to the nearest feet.

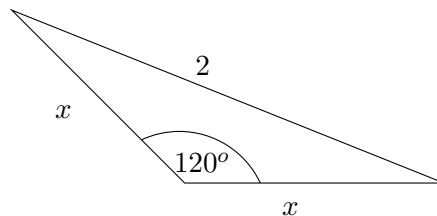
- (a) 5,000 (b) 7,659 (c) 10,155 (d) 8,265 (e) 8,391

24. Using the law of sines, find the value of  $x$  in the following diagram. Round your answer to one decimal.



- (a) 40.1 (b) 50.0 (c) 61.5 (d) 65.4 (e) 69.3

25. Find the value of  $x$  in the following diagram:



- (a) 2 (b)  $\frac{\sqrt{3}}{2}$  (c)  $\frac{2}{\sqrt{3}}$  (d)  $\sqrt{3}$  (e) none of these



**Solution key:**

1. a)
2. a)
3. d)
4. e)
5. c)
6. b)
7. a)
8. b)
9. b)
10. c)
11. b)
12. d)
13. e)
14. b)
15. a)
16. e)
17. c)
18. b)
19. d)
20. c)
21. b)
22. e)
23. e)
24. c)
25. c)